

# SORBITOL EFFECTS ON TAR, NICOTINE AND CARBON MONOXIDE YIELDS OF CIGARETTES

L. Tomić, S. Delač

Duhanski institut Zagreb, Zagreb, Croatia, Yugoslavia

## SUMMARY

The aim of this investigation was to establish whether sorbitol effects changes in tar, nicotine and carbon monoxide yields of cigarettes.

The testing was carried out in the laboratory, on experimental filter cigarettes, made up of Croatian tobaccos of different grades and different leaf groupings. The experimental blend consisted of 70% Virginia and 30% Burley. Sorbitol, a 70% water solution, was applied by spraying. Tobacco mixture was treated with 1%, 3% and 5% sorbitol, respectively.

The results obtained indicate that aforesaid concentrations of sorbitol in the tobacco mixture do not effect any significant changes in tar, nicotine and carbon monoxide yields of a cigarette.

## INTRODUCTION

An optimum moisture content of tobacco is an essential prerequisite for efficient handling, manufacture and storage. Insufficiently moist tobacco is brittle and its taste is unacceptable. Too great a moisture content of tobacco has a negative effect on combustibility, causes colour changes in tobacco, and leads to microbiological changes.

Maintaining an optimum tobacco moisture content is an unavoidable problem in cigarette manufacture. Cigarette manufacturers solve it by adding humectants. The function of humectants is to improve the tobacco's hygroscopic properties. Tobacco, just like other natural materials, is very sensitive to changes in the moisture content of the air surrounding it. Humectants are therefore added to decrease the influence of atmospheric conditions on tobacco. The humectants most frequently used in cigarette manufacture are various alcohols: glycols, glycerol and sorbitol.

Sorbitol belongs to the group of sugar alcohols. It is widespread in nature and is a constituent part of numerous plants, including tobacco. It is chemically stable, thermostable and practically non-volatile, so it is quantitatively retained in tobacco even during processes taking place at increased temperatures. Sorbitol combustion products are akin to the combustion products of the sugars present in tobacco. The above mentioned properties make sorbitol an acceptable additive to tobacco.

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The objective of this research was to determine whether sorbitol added to the tobacco mixture causes changes in the tar, nicotine and carbon monoxide yields of cigarettes made of Croatian tobaccos.

## MATERIALS AND METHODS

The investigations were carried out on an experimental tobacco blend prepared in the laboratory. The blend was made up of tobaccos grown in Croatia and consisted of 70% Virginia and 30% Burley of different grades and leaf groupings.

The tobacco was cut on a laboratory cutting machine. The cutting width was 0.8 millimeters.

The tobacco blend was treated with a 70% sorbitol water solution produced by the firm PLIVA, Zagreb. The sorbitol was applied by spraying. Tobacco blend samples were prepared containing 1%, 3% and 5% sorbitol, as well as a sample without sorbitol which was used as a control.

The chemical properties of the tobacco blend samples were determined by conventional methods of analysis.

Experimental filter cigarettes were hand made from the tobacco blend samples. The cigarettes were prepared using 800 milligrams of the tobacco blend.

Machine smoking of the experimental cigarettes was carried out on a RM 20/CS smoking machine made by the firm Heinrich Borgwaldt. The smoke condensate was trapped on a Cambridge filter. Determination of crude and dry smoke condensate, determination of the nicotine content in the smoke condensate and determination of the carbon monoxide content in the mainstream smoke of cigarettes were carried out according to CORESTA Standard and Recommended Methods.

## RESULTS AND DISCUSSION

The chemical properties of the tobacco blend used to prepare the experimental cigarettes, with and without sorbitol, are presented in Table 1.

TABLE 1  
CHEMICAL CHARACTERISTICS OF THE TOBACCO BLEND

SORBITOL	NICOTINE	PROTEIN N	TOTAL N	REDUCING SUGARS	TOTAL SUGARS
%	%	%	%	%	%
0	2.39	0.9	2.12	13.31	16.62
1	2.37	0.88	2.13	13.24	16.23
3	2.41	0.89	2.11	13.66	16.56
5	2.38	0.87	2.09	13.68	16.91

As was to be expected, there were no changes in the chemical composition of the tobacco blend with sorbitol in comparison to the tobacco blend without sorbitol.

Some characteristics of the experimental cigarettes are presented in Table 2.

TABLE 2  
SOME CHARACTERISTICS OF THE EXPERIMENTAL CIGARETTES

SORBITOL	TOBACCO	DRAW	PUFF NUMBER
%	WEIGHT	RESISTANCE	per
	mg/cig.	mm WG	cigarette
0	800	66	10.2
1	800	66	10.1
3	800	67	10.4
5	800	68	10.5

All the cigarettes contained the same amount of tobacco, had an almost identical draw resistance, and the puff number per cigarette varied slightly.

The tar levels of the cigarettes, the nicotine content in the smoke condensate and the carbon monoxide content in the mainstream smoke of the cigarettes are shown in Table 3.

TABLE 3  
TAR, NICOTINE AND CARBON MONOXIDE LEVELS OF THE EXPERIMENTAL CIGARETTES

SORBITOL	TAR	NICOTINE IN	CARBON
%	mg/cig.	SMOKE CONDENSATE	MONOXIDE
		mg/cig.	mg/cig.
0	22.1	2.15	19
1	21.8	2.12	19
3	21.8	2.13	18
5	22.1	2.12	18

The results presented are the average values of a series of determinations. Regardless of the concentration of sorbitol in the tobacco blend, the tar, nicotine and carbon monoxide yields of the cigarettes were almost identical.

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Some earlier investigations showed that sorbitol is suitable for conditioning Yugoslav tobaccos (1-4), that it has a certain fungistatic effect (5) and that its various properties make it suitable for use as a tobacco additive (6).

The results obtained indicate that sorbitol does not, in any of the concentrations investigated (1%, 3% and 5%), have a significant effect on the tar level, the nicotine content in the smoke condensate or the carbon monoxide content in the gas phase of the smoke of cigarettes prepared from the tobaccos used in this experiment. It may therefore be concluded that, with regard to cigarette smoke yields, sorbitol may be used in the above mentioned concentrations in the manufacture of cigarettes made from tobacco blends similar to those used in this research.

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